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Dieringer

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[54] **SPIKE DRIVING MACHINE INCLUDING IMPROVED RAIL CLAMPING APPARATUS**

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[52] **U.S. Cl.** ..... **104/17 R;** 104/2

[58] **Field of Search** ..... 104/7 R, 7 B, 9, 12, 104/17 R, 2

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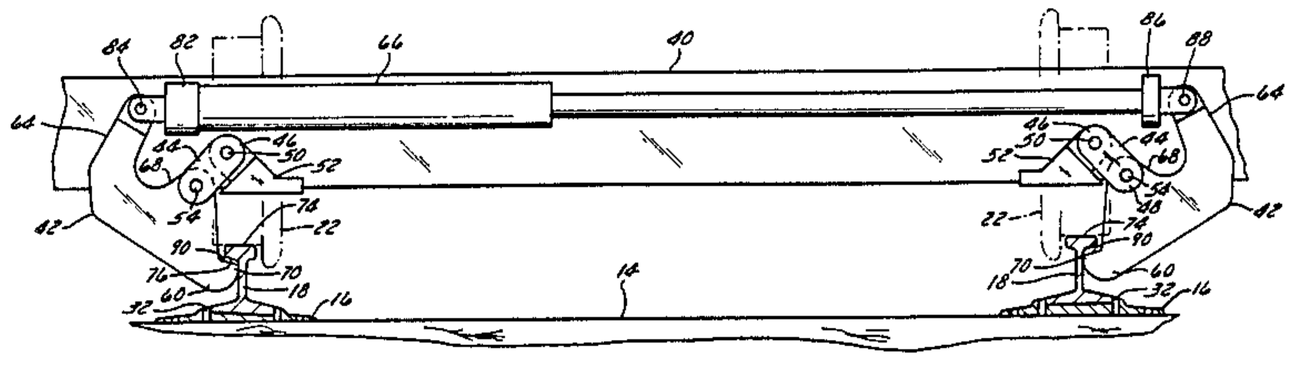
[57] **ABSTRACT**

A spike-driving machine for use in driving spikes into railroad ties and including a rail clamping apparatus for securing the machine to the rails while spikes are being driven into the rails. The rail clamping apparatus can employ only a single hydraulic cylinder and is constructed so as to firmly grip the rails even if the heads of the rails are substantially worn and also constructed so as to grip a variety of different sizes of rails whether or not those rails are new rails or substantially worn.

7 Claims, 5 Drawing Figures



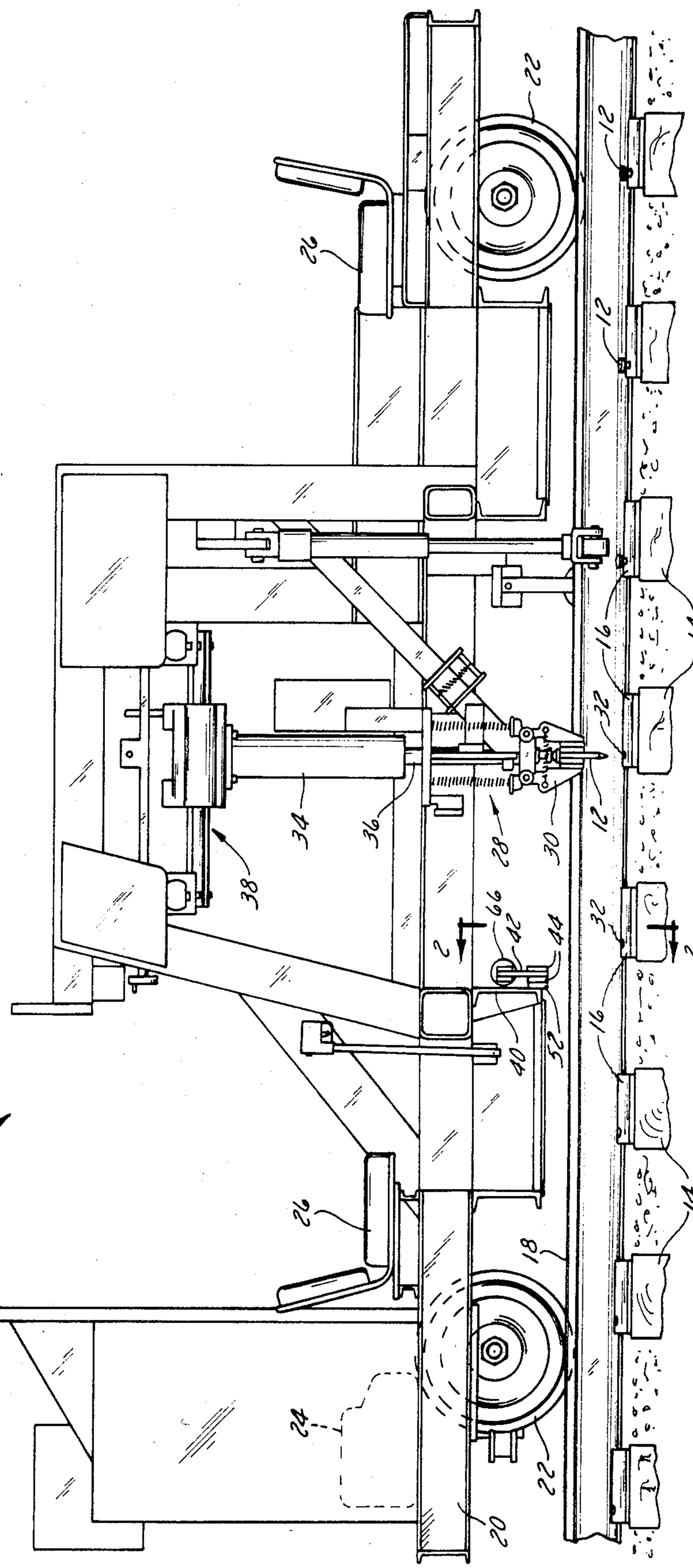

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FIG. 1

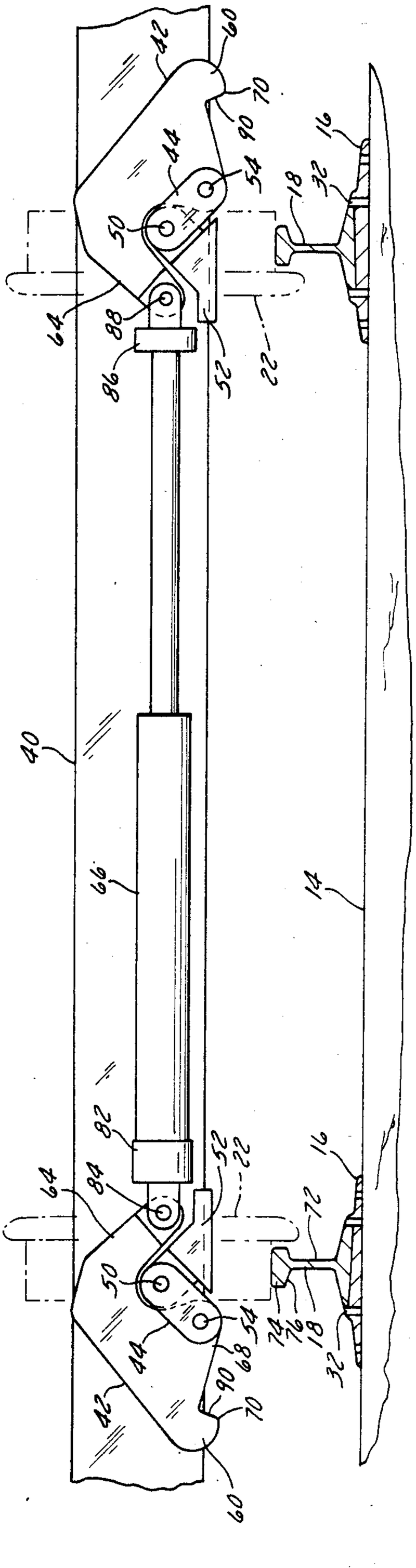
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FIG. 2

FIG. 3

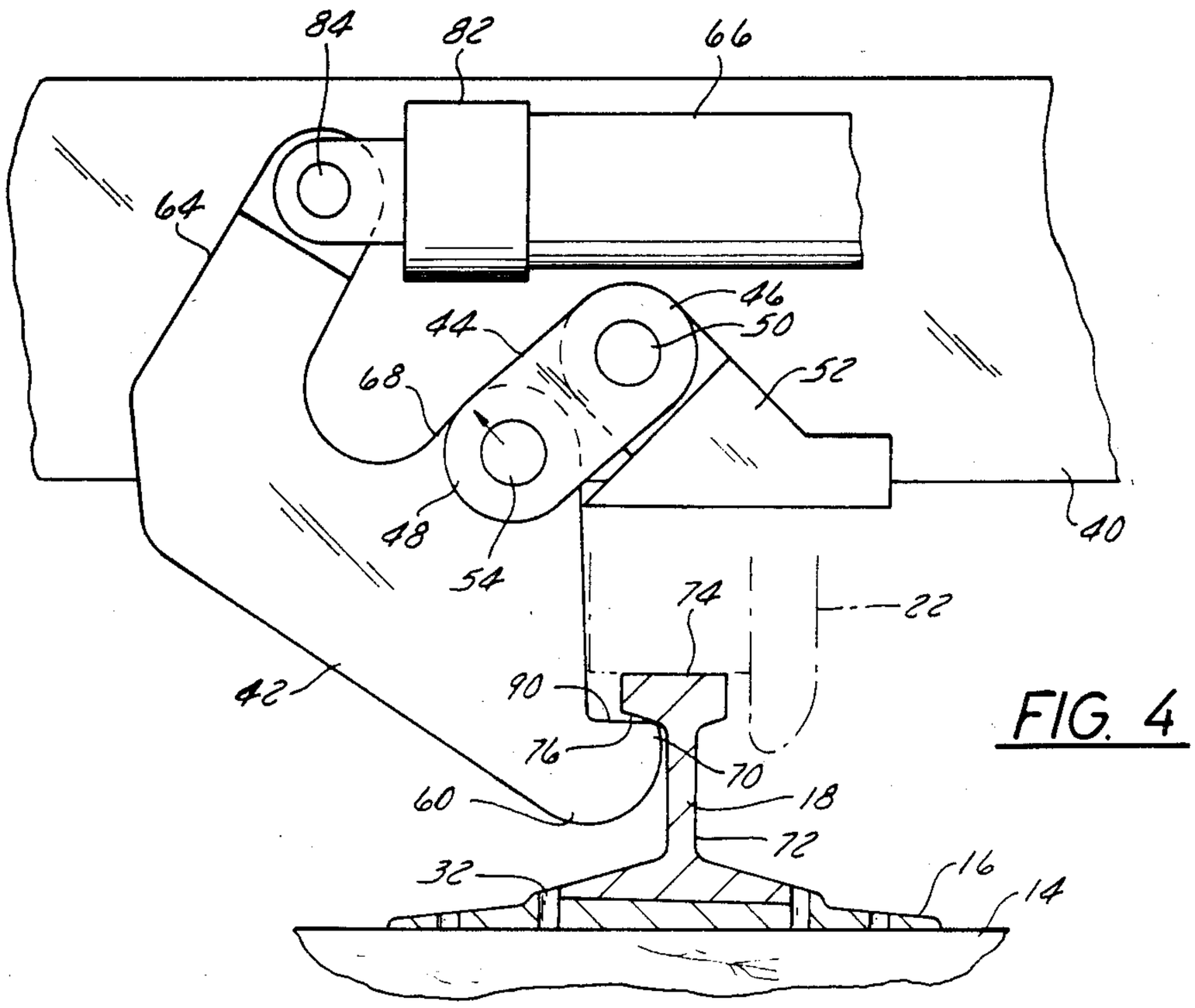
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FIG. 4

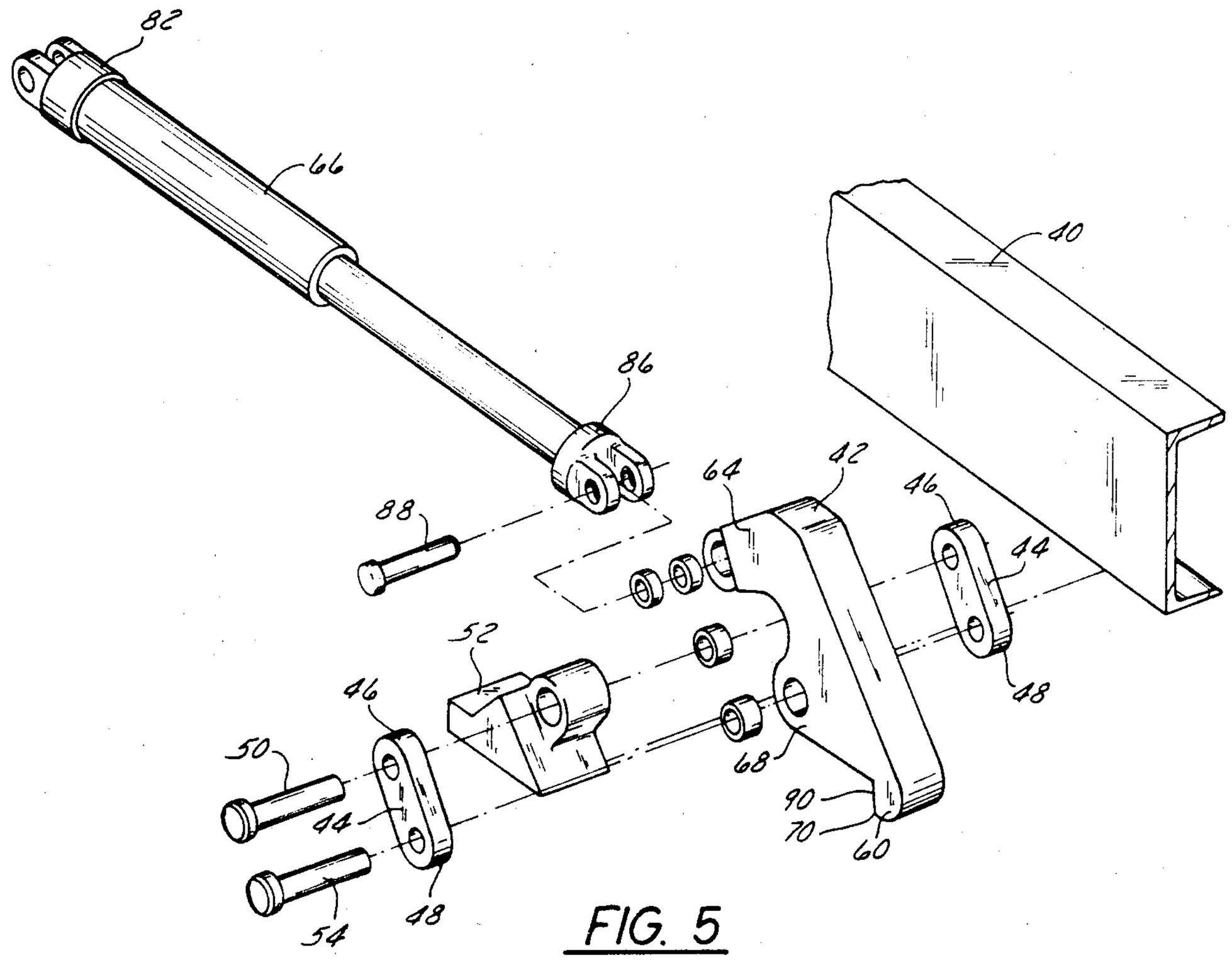
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FIG. 5

SPIKE DRIVING MACHINE INCLUDING IMPROVED RAIL CLAMPING APPARATUS

FIELD OF THE INVENTION

The present invention is directed to machines for use in driving railroad spikes into the ties of a railroad track to secure tie plates and rails to the ties and more particularly to apparatus for securing the spike driving machine down against the rails when the hydraulic spike driving apparatus of the machine forces the spikes down into the rails.

BACKGROUND PRIOR ART

During operation of a railroad spike driving machine, when the hydraulic spike driving apparatus forces the spikes downwardly into the ties, the complementary upward force on the machine tends to lift the machine off of the rails. Accordingly, most spike driving machines include means for clampingly engaging the rails to secure the machine in place when the spikes are driven into the rails.

One form of clamping means includes a pair of jaws connected to vertically extending hydraulic cylinders supporting the jaws for vertical movement between a raised or retracted position and a lowered rail engaging position. These clamping devices also commonly include hydraulic cylinders for causing clamping engagement of the jaws with the rails. These machines have the disadvantage that they have a relatively complicated rail gripping mechanism and may require four or more hydraulic cylinders to clamp the machine against the rails.

A prior art clamping device manufactured by the assignee of the present invention includes a single horizontally extending cylinder. One end of the cylinder is connected to a clamping member which clampingly engages one rail and the other end of the cylinder is connected to a clamping member adapted to grip the other rail. The clamping members are each pivotally joined to the machine frame and include a jaw member which pivots under the head of the rail and is intended to grip the bottom surface of the head of the rail so as to restrain the machine against the rail. The jaw member is an integral part of the clamping member, and the clamping member is pivotally joined by a pivot pin to the machine frame. While this design is preferable to other prior art constructions in that it requires only a single hydraulic cylinder to cause clamping engagement with both rails, in those cases where the heads of the rails are worn down substantially, and wherein the thickness of metal between the top of the rail and the lower surface of the rail head has been substantially decreased, the clamping jaw member may not achieve a firm clamping engagement with the rail head. When the hydraulic apparatus of the spike driving machine then forces the spike downwardly into the tie, the machine will be lifted off of the rails. Repeated spike driving causes the machine to be repeatedly lifted away from the track and this can cause wear of the spike driving machine and is unacceptable to the operator.

SUMMARY OF THE INVENTION

The present invention provides an improved spike driving machine for forcing spikes into railroad ties and an improved means for securing the machine to the rails while spikes are being driven into the rails. The rail clamping means is constructed so as to firmly grip the rails even if the heads of the rails are substantially worn and also constructed so as to grip a variety of different sizes of rails whether or not those rails are new rails or substantially worn.

More specifically, the present invention includes a machine for driving spikes into railroad ties to secure rails to the ties and including a machine frame having a transverse frame member extending transversely to the longitudinal direction of the rails, wheels for supporting the frame for movement along rails, and means supported by the frame for forcing railroad spikes downwardly into the railroad ties to secure the rails in place. The machine also includes means for securing the transverse frame member to the rails when the means for forcing the spikes into the ties forces the spikes downwardly and to prevent the frame from being lifted away from the rails. The means for securing the frame to the rails includes a clamp member supported for pivotable movement about an axis generally parallel to the longitudinal axis of the rail, and the pivot axis of the clamp member being above the longitudinal axis of the rail, and the clamp member including opposite ends. The axis of pivotable movement of the clamp member is intermediate those opposite ends, and one of the opposite ends defines a jaw member. Means are also provided for causing pivotable movement of the clamp member from a retracted position to a position wherein the jaw member extends under the head, the means for causing pivotable movement including a fluid cylinder having one end pivotably connected to the other of the opposite ends of the clamp member. Means are further provided for supporting the clamping member for pivotal movement from the retracted position to a first rail engaging position wherein the jaw member engages the rail web and then for upward movement to a head engaging position wherein the jaw member engages the rail head.

In a preferred form of the invention the clamping member pivots from the retracted position to the first position when the fluid cylinder extends from a retracted position to a first extended position, and the clamping member moves from the first position to the head engaging position when the fluid cylinder extends further to a second extended position.

One of the features of the invention is the provision of a link having opposite ends, one of the opposite ends of the link being pivotally joined to the transverse frame member, and the clamping member being pivotally joined to the other end of the link.

Various other features and advantages of the invention will be apparent by reference to the following description of a preferred embodiment, from the claims, and from the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a side elevation view of a spike driving machine embodying the present invention.

FIG. **2** is a cross section view taken along line **2—2** in FIG. **1**.

FIG. **3** is a view similar to FIG. **2** but showing the clamp members in a rail engaging position.

FIG. **4** is an enlarged partial view of apparatus illustrated in FIG. **3** and showing a clamp member in a rail head clamping position.

FIG. **5** is an exploded perspective view of rail clamping apparatus illustrated in FIGS. **2–4**.

Before describing a preferred embodiment of the invention in detail, it is to be understood that the invention is not limited in its application to the detailed construction and to the arrangements set forth in the following description nor illustrated in the drawings. The invention is capable of other embodiments and of being practiced and carried out in various ways. Also, it is to be understood that the phraseology and terminology employed herein is for the purpose of description and should not be regarded as limiting.

DESCRIPTION OF A PREFERRED EMBODIMENT

Illustrated in FIG. **1** is a spike driving machine **10** embodying the present invention and adapted to drive spikes **12** into railroad ties **14** to secure tie plates **16** and rails **18** to the ties **14**. The machine **10** includes a frame **20** supported on wheels **22** such that the frame **20** can be driven along the rails **18** of a railroad track. The frame **20** supports a conventional internal combustion engine **24** for driving the machine and a pair of operator's seats **26**. The machine **10** also includes a means for driving spikes **12** into railroad ties **14**. The spike driving means **28** is conventional and is not shown in the drawings in detail. Generally the spike driving means **28** includes a spike gripping assembly **30** adapted to grip a spike such that it can be properly positioned over a hole **32** in the tie plate **16** and to support the spike **12** such that it can be driven downwardly through the hole **32** into the tie **14**. The means for driving the spike into the tie is provided by a hydraulic cylinder **34** including a downwardly extending piston **36** adapted to engage the head of the spike **12** and force it into the tie. A support assembly **38** is also provided for supporting the cylinder **34** and the gripping assembly **30** for adjustable movement with respect to the machine frame **20** to provide for alignment of the spike to be driven with the hole **32**.

The frame **20** also includes a transverse frame member **40** extending perpendicularly to the direction of movement of the machine, one end of the transverse frame member **40** being positioned over one of the rails **18** and adjacent the spike driving means **28**, and the other end of the transverse frame member **40** positioned over the other of the rails **18**. While the transverse frame member **40** could have other constructions, in the illustrated arrangement it is comprised of a beam or channel depending from the frame **20** and having one end welded to one side of the frame **20** and an opposite end welded to an opposite side of the frame **20**.

Means are also provided for clamping the machine **10** to the rails **18** when the machine drives spikes **12** into the ties **14**, the clamping means including a pair of clamp members **42** (FIGS. **2–4**) pivotally supported by the opposite ends of the transverse frame member **40**. The clamp members **42** have the same construction and, accordingly, only one of the clamp members **42** will be defined in detail. Each of the clamp members **42** is supported by a pair of parallel pivotable connecting links **44**. The connecting links **44** are positioned on opposite sides of the clamp members **42**, and one end **46** of each of the links **44** is pivotally joined to the transverse frame member **40**, and an opposite end **48** pivotally supports the clamp member **42** for pivotal movement about a pivot axis parallel to the longitudinal axis of the rail **18** and perpendicular to the longitudinal axis of the transverse frame member **40**.

More specifically, the links **44** are pivotally connected to the transverse frame member **40** by a pivot pin **50** supported by a bracket **52** which is in turn fixed to the transverse frame member **40**, and the opposite ends **48** of the link **44** are pivotally connected to opposite sides of the clamp member **42** by a second pivot pin **54**.

As illustrated in FIG. **2**, the links **44** are supported such that they extend generally downwardly from the upper end of the bracket **52** and away from the central portion of the spike driving machine **10**.

In the illustrated construction the clamp member **42** has a bellcrank configuration or "L" shaped construction with one leg of the "L" having an end **60** adapted to clampingly engage a rail **18**, and the other leg of the "L" has a free end **64** adapted to be pivotally connected to a hydraulic cylinder **66**. The clamp member **42** also includes a projecting portion **68**, the projecting portion defining a lobe including a bore housing the pivot pin **54** connecting the lower end **48** of the links **44** to the clamp member **42**.

The end **60** of the clamp member **42** adapted to engage the rail **18** defines a jaw portion spaced radially from the pivot axis of the clamp member, and the clamp member is shaped such that as the clamp member pivots from a retracted position (FIG. **2**) to a rail engaging position (FIG. **3**), the end **70** of the jaw member **60** will contact the web **72** of the rail **18**.

In the event the rail **18** supporting the spike driving machine **10** is a worn rail wherein the rail head **74** will be thinner than the rail head of a new rail, as shown in FIG. **3** the jaw member **60** will be positioned below the lower surface **76** of the rail head **74**.

Means are also provided for causing pivotal movement of the clamp members **42** from the retracted position to the position wherein the clamp members **42** clampingly engage the rail **18**. In the illustrated arrangement the means for causing clamping movement includes the hydraulic cylinder **66** extending generally horizontally adjacent the transverse frame member and including one end **82** pivotally connected by a pin **84** to one of the clamp members **42** and an opposite end **86** pivotally connected by a pin **88** to the other of the clamp members **42**. The ends **82** and **86** of the hydraulic cylinder **66** are pivotally connected to the free ends **64** of the clamp members **42** such that these structures are pivotable with respect to each other about axes parallel to the longitudinal axes of the rails **18**.

In operation of the apparatus for causing selective movement of the clamping members **42**, extension of the hydraulic cylinder **66** first causes pivotal movement of each of the clamp members **42** from the retracted position to a position wherein the jaw portion **60** extends under the rail head **74** and engages the rail web **72**. The clamp member **42** is freely pivotable about the axis of pivot pin **54** such that during initial extension of the cylinder **66**, the clamp member **42** will pivot about that pivot pin until the end **60** contacts the rail **18**. In the case of a new rail or a rail which is not substantially worn, the surface **90** of jaw **60** will also engage the lower surface **76** of the rail head **74**. In the event the rail **18** is worn and the rail head **74** is of reduced height, when the end **70** of the jaw **60** engages the rail web **72**, the engaging surface **90** of the jaw **60** will be spaced below the lower surface **76** of the rail head **74**. During extension of the cylinder **66**, once the jaw **60** engages the web **72** further rotation of the clamp member **42** about the axis of the pivot pin **54** is prevented, and further extension of the cylinder **66** will tend to cause movement of the clamp member **42** in the direction of extension of the end **82** of the cylinder **66**. Since the ends **48** of the links

44 pivotally joined to the clamping member 42 are below the pivot axis of the links 44, outward movement of the ends 48 of the links will also cause upward swinging movement of the links about the pivot axis of pivot pin 50, and the links 44 will cause the clamp member 42 to swing upwardly as it moves outwardly with the end 82 of the cylinder 66. Such upward movement of the clamp member 42 causes the engaging surface 90 of the clamp member to clampingly engage the lower surface 76 of the rail head 74.

Thus, whether the rail is new or the rail head is substantially worn, the clamp member 42 will firmly clampingly engage the rail 18 and prevent upward movement of the spike driving machine 10 with respect to the rail 18 when the spikes 12 are driven into the rail.

While in the illustrated arrangement a single hydraulic cylinder 66 is provided, with one end connected to one of the clamp members 42 and an opposite end connected to the other clamp member 42, in other embodiments, separate hydraulic cylinders could be provided for each clamp member 42.

Various features of the invention are set forth in the following claims.

I claim:

1. Apparatus for securing a spike driving machine to the rails of a railroad track when the spike driving machine forces spikes into the ties of the track and to prevent the frame from being lifted away from the rails, and wherein the rails each include a rail head portion supported by a rail web, the rail head portion including a lower surface, the apparatus for securing the machine to the rails comprising:

a clamp member supported for pivotable movement about a pivot axis generally parallel to the longitudinal axis of the rail above the longitudinal axis of the rail, the clamp member including a jaw member spaced from the pivot axis,

means for causing pivotable movement of the clamp member from a retracted position to a position wherein the jaw member extends under the head of a rail, the means for causing pivotable movement including a fluid cylinder having one end pivotably connected to the clamp member,

means for supporting the clamp member for pivotal movement from the retracted position to a first rail engaging position wherein the jaw member engages the rail web and then for upward movement to a head engaging position wherein the jaw member engages the rail head,

said clamp member pivoting from the retracted position to the first rail engaging position when the fluid cylinder extends from a retracted position to a first extended position, and wherein the clamp member moves from the first rail engaging position to the head engaging position when the fluid cylinder extends further to a second extended position, and

wherein the means for supporting the clamp member includes a link having opposite ends, one of the opposite ends of the link being pivotally joined to the machine and said clamp member being pivotally joined to the other of the opposite ends of the link.

2. Apparatus set forth in claim 1 and wherein the other of the opposite ends of the link is positioned below the said one of the opposite ends of the link.

3. A machine for driving spikes into railroad ties to secure rails to the ties, the rails including a rail head portion supported by a rail web, and the head portion including a lower surface, the machine comprising:

a frame including a transverse frame member extending transversely to the longitudinal direction of the rails,

wheels for supporting the frame for movement along the rails,

means supported by the frame for forcing railroad spikes downwardly into the railroad ties to secure the rails in place, and

means for securing the frame to the rails when the means for forcing the spikes into the ties forces the spikes downwardly and to prevent the frame from being lifted away from the rails, the means for securing the frame to the rails including

a clamp member supported for pivotable movement about a pivot axis generally parallel to the longitudinal axis of the rail and above the longitudinal axis of the rail, one portion of the clamp member defining a jaw member adapted to extend under the rail head and engage the lower surface of said rail head,

means for causing pivotable movement of the clamp member from a retracted position, wherein the jaw member is spaced from the rail head, to a position wherein the jaw member extends under the rail head and engages the lower surface, the means for causing pivotable movement including a fluid cylinder having one end pivotalby connected to the clamp member at a position spaced from said jaw member and spaced from the pivot axis,

means for supporting the clamp member for pivotal movement from the retracted position to a first rail engaging position wherein the jaw member engages the rail web and then for upward movement to a head engaging position wherein the jaw member engages the lower surface of the rail head,

said clamp member designed to pivot from the retracted position to the first rail engaging position when the fluid cylinder extends from a retracted position to a first extended position and wherein the clamp member moves from the first rail engaging position to the head engaging position when the fluid cylinder extends further to a second extended position, and

wherein the means for supporting the clamp member includes a link having opposite ends, one of the opposite ends of the link being pivotally joined to the transverse frame member and said clamping member being pivotally joined to the other of the opposite ends of the link.

4. A machine for driving spikes as set forth in claim 3 and wherein the other of the opposite ends of the link is positioned below the said one of the opposite ends of the link.

5. A machine for driving spikes into railroad ties to secure rails to the ties, the rails including a rail head portion supported by a rail web, and the head portion including a lower surface, the machine comprising:

a frame including a transverse frame member extending transversely to the longitudinal direction of the rails,

wheels for supporting the frame for movement along rails,

means supported by the frame for forcing railroad spikes downwardly into the railroad ties to secure the rails in place, and

means for securing the frame to the rails when the means for forcing the spikes into the ties forces the

spikes downwardly and to prevent the frame from being lifted away from the rails, the means for securing the frame to the rails including

a pair of clamp members, one of the clamp members supported adjacent one of the rails and the other of the clamp members supported adjacent the other of the rails, the clamp members being supported for pivotable movement about axes generally parallel to the longitudinal axes of the rails, and the pivot axes of the clamp members being above the longitudinal axis of the rails, and each of the clamp members including a jaw member spaced from the pivot axis of that clamp member,

means for causing pivotable movement of the clamp members from retracted positions to positions wherein the jaw members extend under the rail heads, the means for causing pivotable movement including a fluid cylinder having one end pivotably connected to one of the clamp members and an opposite end pivotably connected to the other of the clamp members,

means for supporting each of the clamp members for pivotal movement from the retracted position to a first rail engaging position wherein the jaw member engages the rail web and then for upward movement to a head engaging position wherein the jaw member engages the rail head,

said clamp members pivoting from the retracted positions to the first rail engaging positions when the fluid cylinder extends from a retracted position to a first extended position and wherein the clamp member moves from the first position to the head engaging position when the fluid cylinder extends further to a second extended position, and

wherein the means for supporting each of the clamping members includes a link having opposite ends, one of the opposite ends of the link being pivotally joined to the transverse frame member and the other of the opposite ends of the link pivotally supporting one of the clamp members for pivotal movement about a pivot axis.

6. A machine for driving spikes as set forth in claim 5 and wherein the other of the opposite ends of the link is positioned below the said one of the opposite ends of the link.

7. A machine for driving spikes into railroad ties to secure rails to the ties, the rails including a rail head portion supported by a rail web, and the head portion including a lower surface, the machine comprising:

a frame including a transverse frame member extending transversely to the longitudinal direction of the rails,

wheels for supporting the frame for movement along the rails,

means supported by the frame for forcing railroad spikes downwardly into the railroad ties to secure the rails in place, and

means for securing the frame to the rails when the means for forcing the spikes into the ties forces the spikes downwardly and to prevent the frame from being lifted away from the rails, the means for securing the frame to the rails including

a clamp member supported for pivotable movement about a pivot axis generally parallel to the longitudinal axis of the rail and above the longitudinal axis of the rail, one portion of the clamp member defining a jaw member adapted to extend under the rail head and engage the lower surface,

means for causing pivotable movement of the clamp member from a retracted position, wherein the jaw member is spaced from the rail head, to a position wherein the jaw member extends under the rail head and engages the lower surface of said head, the means for causing pivotable movement including a fluid cylinder having one end pivotably connected to the clamp member at a position spaced from said jaw member and spaced from the pivot axis,

means for supporting the clamp member for pivotal movement from the retracted position to a first rail engaging position wherein the jaw member engages the rail web and then for upward movement to a head engaging position wherein the jaw member engages the lower surface of the rail head,

said clamping member pivoting from the retracted position to the first rail engaging position when the fluid cylinder extends from a retracted position to a first extended position and wherein the clamp member moves from the first rail engaging position to the head engaging position when the fluid cylinder extends further to a second extended position, and

wherein the force exerted on one of said rails by said clamping member has a vertical component and a horizontal component which allows said machine to be securely held on said rails by said clamp means located on one side only of each of said rails.

* * * * *